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THOMAS-MORSE AIRCRAFT CORPORATION

Thomas-Morse Training 2-Seater in flight over Ithaca, N. Y.

THOMAS-MORSE AIRCRAFT CORPORATION

The Future of Transportation

WHEN Robert Fulton first introduced the steamboat, in 1811, our grandfathers shook doubtful heads.

When George Stephen's first locomotive, the Rocket, made twenty-nine miles an hour on its initial trip, a German professor stated that railroads were impracticable, for such a speed would surely induce brain fever.

Within our own generation we can recall the doubt with which the first automobiles were introduced as toys for the idle rich. Twenty-five years ago, there were in the United States only four automobiles. Today there are eight million.

Within twelve years the airplane has risen from an experiment to an active factor in Commerce. No other invention has ever shown such rapid growth, and yet the airplane is still in its infancy.

From the very beginning of the aeronautical industry The Glenn L. Martin Company has maintained an enviable position as one of the foremost builders of superior aircraft.

The Glenn L. Martin Company believes in the airplane as a vehicle of Commerce, and in the future of Aerial Transportation.

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AVIATION AND AIRCRAFT JOURNAL

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Aviation for Coast Defense

THE news that the Commonwealth of Australia has decided to build a naval air fleet which is to consist of six squadrons of twelve seaplanes each affords an insight into that country's farsightedness. Having a surface area nearly as large as the United States, but with a population of only 5,000,000, Australia naturally cannot afford to maintain a surface fleet that would be adequate to defend its extensive coast line against foreign invasion. But the low production and maintenance cost of aircraft advantageously solves the problem of cheap coast defense.

The experience of the late war and, even more so, the outcome of the recent bombing tests off the Virginia Capes prove that airplanes and seaplanes are capable of effectual offense as well as of observation and the attendant protection work, pursuit. It is not overstating the case to say that when bombing and torpedo-carrying airplanes or seaplanes will have been fully developed, a country possessing such machines in adequate numbers with a properly trained personnel will be capable of successfully defending its coast line against any naval attack. Of course, to make such a coastal aviation fully effective it must also comprise the necessary proportion of observation and pursuit machines.

The prediction, often made in the past, that the airplane would eventually become the defensive weapon *par excellence* of countries which cannot shoulder heavy armament expenditures thus seems to become true. In the past the smaller maritime countries found it necessary to keep a semblance of a fighting fleet in the shape of coast defense monitors, protected cruisers and destroyers, which often were acquired second hand to reduce the expense. The best such vessels were capable of doing was to show the country's flag in foreign ports, for any first class navy would have sent them to the bottom with little loss to itself. These third rate navies were therefore rather an expensive plaything to the countries concerned, considering that their actual value for national defense was in the neighborhood of nil. But now the advent of offensive aircraft promises to change this situation. Small countries which in the past had no means of adequate defense against a powerful agressor now find in the airplane the very weapon they were looking for. It is effective and cheap, and besides it soon becomes obsolete. The latter point naturally prevents the building up of a huge air fleet through the accumulation of older types and thus every country large or small, has an equal chance to build up and to maintain an efficient coast defense aviation.

Australia is not alone to have perceived this truth. Several South American countries are making a strong effort to put their coast defenses on the aerial plan, so to speak, and the Netherlands, among others, are builidng up an up-to-date air force for the protection of the Dutch East Indies.

The Monoplane Is Returning

IT is becoming increasingly evident that there is a distinct tendency among aeronautical engineers to return to the monoplane type, at any rate for single-engined machines. The reason for this reversal of policy is that the tractor biplane has been brought to such a state of efficiency that a better performance can only come from wing sections embodying much better L/D characteristics than are now available. While several new wing sections of supposedly superior design are under development, these have not as yet emerged from the experimental stage. Hence the monoplane offers a much more immediate field for improvements of performance.

Owing to the lack of interference such as occurs in superimposed or tandem wing arrangements the lift of a monoplane wing is about 25 per cent more efficient than that of a biplane. If, then, the parasite resistance is no greater in a monoplane than in a biplane, the former type naturally becomes the logical machine.

Now, in a biplane the main portion of the parasite resistance is represented by the struts and wire trusses which hold the wing cells together. In a monoplane this parasite resistance can either be greatly reduced or else entirely done away with by using semi-cantilever or full cantilever wings. The Loening monoplane represents the former system; the Junkers and the Fokker the latter.

In either case the monoplane type has proven to be greatly superior in performance to biplanes of the same wing loading and power loading. In operation this means that a monoplane can either carry the same load as a biplane with less horse power, or that with the same horsepower it can carry a greater load or have a better performance.

The importance of this development is obvious insofar as commercial aeronautics is concerned, for it tends to make more economical the operation of civil airplanes.

The cantilever monoplane has, with respect to the biplane, some further advantages which mainly concern the comfort and well-being of the passengers. With the wings fitted flush with the top of the fuselage the access into the cabin of a monoplane is as easy as stepping into a limousine. On the other hand, in flight the passengers enjoy almost unrestricted vision downward, which adds to the pleasures of flying. The experience of the European airways seems to prove that aerial passengers are, particularly on long flights, subject to spells of boredom which even the comforts of up-to-date cabins do not succeed in allaying. It has been found that the most disgruntled passengers are in general those whose vision of the outside world during the whole flight is limited to an engine mounting or to a couple of struts, when they would be keen to watch the farmhouses and railroads, the harbors and inlets, etc. These may seem trivial details, but if aerial travel is to be made attractive to the prospective passenger, such details should not be overlooked.

The New Longren Airplane

The Longren Aircraft Corp., of Topeka, Kansas, in its latest model has endeavored to meet the demand for a moderate priced airplane for use as a business and pleasure vehicle by the individual owner. The machine, which is illustrated herewith with the wings folded, is adaptable for short and long journeys and passenger carrying. The cost of operation is low, and what will be especially appreciated by the individual owner is that a complete repair list is furnished with each machine and all parts are numbered and carried in stock. The space required to house the machine is small due to the folding wings. A detailed description and specifications of the machine follow.

Fuselage

The fuselage is made of hard vulcanized fiber molded to a good streamline form. The fiber is fastened on the top and the bottom center lines to two ash longerons and is reinforced with laminated ash ribs, giving an exceptionally strong and rigid assembly that is resilient and shock resisting. The fiber used has a strength weight ratio double that of plywood or veneer and cannot be splintered or shattered. The combustion point of 650 deg. F. is an added advantage over wood or fabric covering, and makes it practically fireproof. The fuselage is water-proofed inside and outside after assembly. The cockpit opening is reinforced with ash ribs. The side door, while permitting easy entrance and exit, is designed to preserve the full strength of the fuselage at this point.

Wings

The U.S.A. No. 2 wing section, slightly modified, is used. This section is especially adaptable for a commercial airplane of this size. The wing spars are built up "I" sections of spruce. The ribs are made with plywood web and ash cap strips. Fittings are standardized and interchangeable. Ailerons are fitted on the upper wing only and are interchangeable. Aileron control is by torque tube with the operating arm in line with the rear hinge of the wing. Swivels are provided on the arms to allow the wings to fold without affecting the controls. The center section is supported by four short struts and braced by streamline straps in front and a "V" tube at the rear.

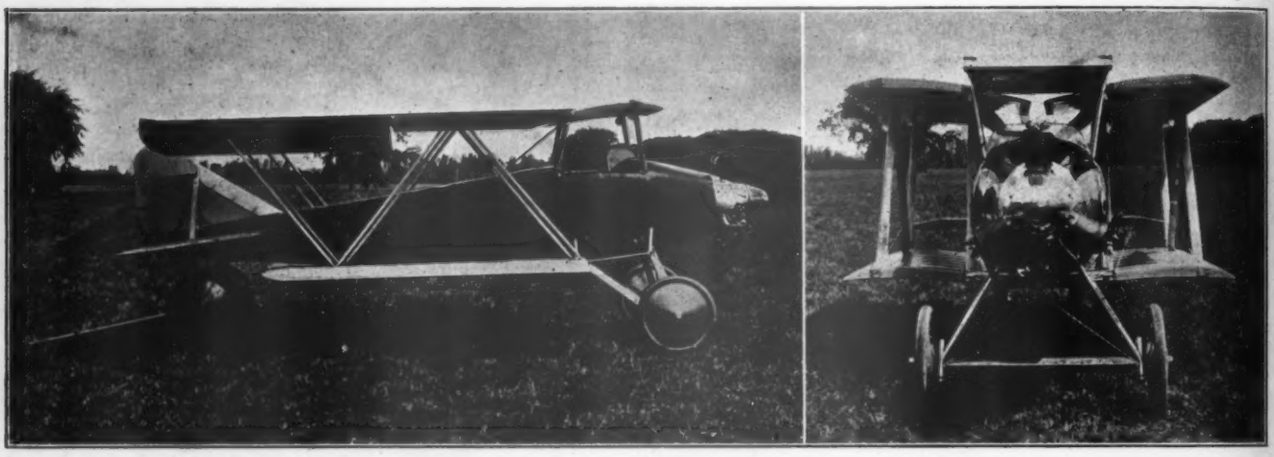
The Warren truss system is used and is so arranged as to allow the wings to be folded without disturbing the setting of the wings or controls. No adjustments are required for the operation. Four fitting pins are unlocked and removed and the wings folded back. For towing, the wings are braced to the body with tubes provided for the purpose. This eliminates danger from rough roads. The machine when folded can be towed behind a car from landing field or garage without damage. The folding wing feature is the best solution to the housing problem.

Tail Plane

The tail surfaces are made thick enough to require a minimum of external bracing, only two braces being used, and no wires. Rudder and elevators are operated by torque tube. The torque tube also acts as the front spar of these controls, the same as in the ailerons. The elevator controls are entirely enclosed in the body and the rudder control has a short arm and only a very short wire exposed. The elevators are interchangeable and also the two halves of the stabilizer. The tail skid is of the steel leaf spring type, faired, and fastened to the lower longeron directly under the last body rib. The compression load of the skid is carried by a duralumin compression plate. The skid is of a neat and compact design, giving maximum strength with minimum resistence.

Controls

The cockpit is entered through a side door which is designed to retain the strength of the body. The pilot and passenger sit side by side on an upholstered seat of comfortable width. The seat is the same width as the standard Pullman seat, and is cushioned.



SIDE AND FRONT VIEWS OF THE LONGREN TWO-SEATER WITH WINGS FOLDED

The standard stick and foot-bar controls are convenient for instruction and are arranged to leave no moving parts exposed. This arrangement makes a clean and roomy cockpit with no danger of the pilot or passenger's clothing catching on any part. The aluminum instrument board is in view of both the pilot and passenger and carries the necessary instruments and engine controls. These instruments include a tachometer, altimeter, map case, clock, gasoline gage, oil pressure gage, motometer, engine switch and engine control lever.

Baggage space is provided under the seats. A windshield completes the comfort of the occupants.

Engine

A Lawrence three-cylinder radial air-cooled engine of 60 hp. is bolted directly to the substantial plywood nose panel of the body, giving a strong simple mounting. The engine cowling continues the lines of the fuselage, leaving only the ribbed portion of the cylinders exposed to the air.

Landing Gear

The landing gear is neat and simple in design. The streamline struts terminate at the lower end in the duralumin shock absorber housings which enclose the shock absorbers. The axle is faired to give a lifting section. The leading edge of the axle fairing is used as the compression member between the landing struts. The trailing edge is attached to the axle and rises and falls with it. Both the leading and trailing edges are of duralumin. The tension members of the landing

gear are streamline straps. The wheels are faired with duralumin sheet giving a light but stiff and durable fairing.

Test Flight

The new Longren made its test flight under adverse conditions. The take-off was on a wet field with grass so high it impeded the propeller. The machine left the ground in 125 ft.

H. Smith, 185 pounds, who did the testing, put the machine through spins, loops, rolls and other strength-testing stunts. He landed with a 75 ft. run.

Specifications

Span—upper plane	27 ft. 11 in.
Span—lower plane	21 ft. 11 in.
Length—overall	19 ft.-0¼ in.
Wing Section	U. S. A. No. 2 slightly modified
Height	7 ft. 8 in.
Chord—both planes	4 ft. 3 in.
Gap	4 ft. 3 in.
Incidence—upper plane	3 deg.
Incidence—lower plane	2 deg.
Decalage	1 deg.
Dihedral	3 deg.
Incidence—tail plane	1½ deg.
Engine	Lawrance air-cooled radial 60 hp.
Weight, empty	550 lb.
Weight, loaded	1,050 lb.
Useful Load	500 lb.
Areas—	
Wings, Including Ailerons	189.0 sq. ft.
Ailerons (2)	19.1 sq. ft.
Stabilizer	13.5 sq. ft.
Elevators (2)	11.4 sq. ft.
Fin	2.6 sq. ft.
Rudder	5.6 sq. ft.
Wing loading	5.55 lb. per sq. ft.
Power loading	17.5 lb. per. hp.
Overall Dimensions, Wings Folded—	
Length	19 ft. 0¼ in.
Width	9 ft. 8 in.
Height	7 ft. 2 in.

The Rigid Airship Situation

Orders have gone out for a sharp reduction of the personnel at Lakehurst, N. J., the Naval Air Station for airships, as a result of the destruction of the ZR-2. In anticipation of the arrival of the ill-fated dirigible a crew in excess of 500 was being maintained to assist in getting the craft in and out of the hangar. It is expected to maintain about 100 men at the station, the remainder being transferred to other air station or to the ships of the fleet.

Estimates prepared by the Bureau of Naval Aeronautics are that $750,000 will be required to complete the ZR-1, which is under construction at the Naval Air Station at Lakehurst, N. J. The amount already spent for the rigid is $1,350,000. The Navy asked Congress for $1,000,000 to complete the airship, but the item was stricken from the Naval appropriation bill and made a part of the lump sum appropriation for aircraft. The amount necessary to complete the construction will be drawn from this fund.

Virtually all the material required for the ZR-1 has been purchased, according to Navy Department officials, and it is now being fabricated at Philadelphia. When this is finished it will be shipped to Lakehurst for assembly. The work of erection is about 25 per cent complete. It will require fully a year, in the opinion of Rear Admiral Moffett, chief of the Bureau of Naval Aeronautics, before the airship is finished.

Mexican Air Transport Service Starts

The first Mexican air transport service was inaugurated on Aug. 30, last, between Mexico City and Tampico by the Mexican Air Transport Co. The airplane, a Lincoln-Standard "Tourabout" fitted with a 150 hp. Hispano-Suiza engine, carried a passenger and 165 lb. of mail. The pilot was C. V. Pickup. The machine left Mexico City at 7.05 a. m., stopped at Tuxpan at 10.30 a. m. and arrived at Tampico without any incident at 2.45 p. m.

While this first flight was in the nature of an experiment, the operating company intends to establish a regular service before long.

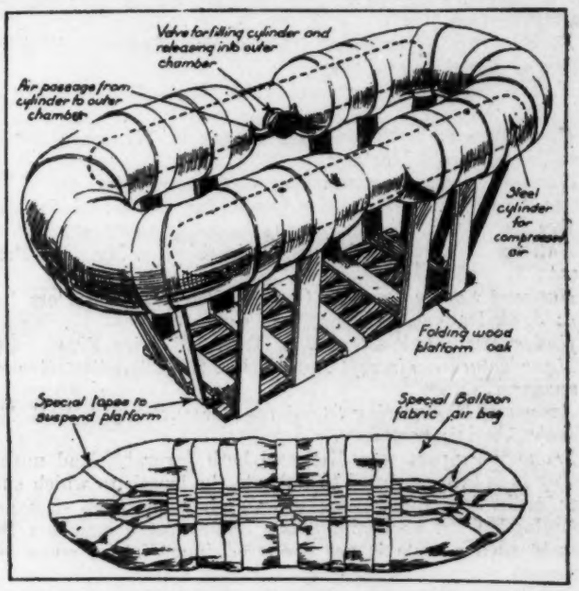
New York to San Francisco

A Fiat engined Ansaldo A300-3 purchased from the Aero Import Corp. by Mr. James Otis of San Francisco recently completed the trans-continental flight, with Lloyd Bertaud as pilot, and the owner and mechanic as passengers.

The Austin Life-Float

Additional information is now available regarding the airplane life-float constructed by W. J. Austin & Co., of Swansea, England, which was summarily described in our issue of July 11, 1921.

This "life-float" is of the collapsible type, taking up but comparatively little space, and is capable of supporting four persons. It consists of two compressed air cylinders, over which are secured two tubes of balloon fabric in the manner shown in the accompanying sketch. One end of each tube is secured to the center of the compressed air cylinder so that the ends of one tube abut the ends of the other, thus forming a tubular ring with the air cylinders located within. Each cylinder has a valve communicating with the tubes, and on opening the valves the latter are immediately inflated, producing an oval-shaped ri•g of considerable buoyancy. Suspended some two feet below it, by means of fabric bands passing over the tubes, is a folding wooden platform,


Valve for filling cylinder and releasing into outer chamber
Air passage from cylinder to outer chamber
Steel cylinder for compressed air
Folding wood platform oak
Special tapes to suspend platform
Special Balloon fabric air bag

SCHEMATIC DRAWING OF THE AUSTIN LIFE FLOAT

upon which the occupants stand. A wall of net may be fitted between the platform and the tubes, to prevent anyone from slipping "overboard".

When in use this life-boat is 7 ft. long by 4 ft. wide, the diameter of the inflated tubes being 1 ft. 4 in. When deflated, it folds up to an overall length of 5 ft. and a width of 1 ft. 3 in.; the depth then is only 6 in. The approximate weight is 56 lb.

During tests carried out before representatives of the British Air Ministry an Austin life-float complete with two paddles was dropped into the sea from an Avro flying at a height of 100 ft. The test proved that the lift-float will survive very rough treatment, for no damage resulted to the equipment.

Another test carried out by members of the Swansea Swimming Club demonstrated that the buoyancy is greatly in excess of that required for bare flotation, and that the life lines made it easy to board the craft.

Air Service Machines Use Lakeside Oil

As United States Army airplanes were included in the military forces concentrated in the West Virginia coal mine riot zone, the C. L. Maguire Petroleum Co. on Sept. 2nd received an order for 2 cars of Lakeside aviation oil to be shipped direct to the military command in the riot area.

An outstanding feature of the transaction was the service given the order by the Maguire company who dispatched the shipment by express within 24 hours after the order was placed.

A Proposed Aeronautical Safety Code

At a meeting held in Washington, D. C., some time ago a syllabus of a proposed Aeronautical Safety Code was presented. This code it is understood was prepared by the Bureau of Standards. The following representatives of various organizations interested in this problem were invited and most of them were present.

Society for Automotive Engineers. David Beecroft, Pres.; C. F. Clarkson, Gen. Mgr.; Glenn L. Martin, Member of Council; L. M. Griffith, Member of Aeronautic Div.; John R. Cautley, Meetings Committee; Prof. E. P. Warner, Mass. Institute of Tech.

Bureau of Standards. Dr. S. W. Stratton, Director; Dr. E. B. Rosa, Chief of Div. I; Dr. L. J. Briggs, Chief of Div. VI; Dr. H. C. Dickinson, Chief, Airplane Power Plant Sec.; Dr. M. G. Lloyd, Chief of Safety Section; Mr. Arthur Halsted, Safety Section.

U. S. Navy Department. Commander Kenneth Whiting, Office of Naval Operations.

U. S. Post Office Department. Maj. E. C. Zell, Gen. Supt., Air Mail Service.

U. S. War Department. Maj. Walter R. Weaver, Air Service, Maj. Harold Hartney.

National Advisory Committee for Aeronautics. Dr. J. S. Ames, Chairman of Executive Committee; G. W. Lewis, Executive Secretary.

National Aircraft Underwriters Association. Mr. Ely, President; A. Ryder, Manager.

National Safety Council. Geo. E. Peterson, Travelers Ins. Co.; J. G. Baukat, Travelers Ins. Co.

Underwriters Laboratories. A. R. Small, Vice Pres.

Manufacturers Aircraft Association. S. S. Bradley, General Manager.

American Engineering Standards Committee. Dr. A. S. McAllister, Acting Secretary.

While the report was discussed both favorably and unfavorably it is being printed to indicate the length to which such standardization and regulation can go even in so new and changing an art as aeronautics. Some of the members feel that if such a code is not prepared immediately, some less informed organization may take unwise action. It is felt by many that the time has not come yet for such a code but it affords suggestions which will be read with interest.

AMERICAN AERONAUTICAL SAFETY CODE

Proposed Divisions

INTRODUCTORY PART

Scope and application of the rules; Exceptions; General requirements; Nomenclature; Definitions.

PART I. AIRPLANE STRUCTURE — DESIGN, CONSTRUCTION AND TESTS

Design of airplanes; Arrangement; Construction; Wind tunnel; Static and flying tests; Inspection; Specifications for materials and parts; Minimum factors of safety; Stress calculations.

PART II. POWER PLANT — DESIGN, CONSTRUCTION AND TESTS

Design of Power plant; Construction; Fuel tanks; Piping; Lubrication; Ignition; Cooling; Exhaust; Auxiliaries; Engine controls; Inspection and tests; Specifications and tests for materials; Factors of safety.

PART III. EQUIPMENT, MAINTENANCE AND OPERATION OF AIRPLANES

Instruments; Safety devices; Lights; Inspection; Maintenance; Repairs; Shipments; Marking; Log records.

PART IV. SIGNALS AND SIGNAL EQUIPMENT

Signal equipment for airdromes and aircraft; Flags; Lights; Beacons; Radio; Signals.

PART V. LANDING FIELDS AND AIRPORTS

Classification; Size; Markings; Building restriction; Equipment; Hangars.

PART VI. TRAFFIC, FLYING AND PILOTAGE RULES

Rights of way; Flying over cities; Trick and exhibition flying; Ballast; Take-off; Landings; Airroutes; Control.

PART VII. QUALIFICATIONS FOR AVIATORS AND AERONAUTS

Physical Qualifications; Experience; Technical knowledge.

PART VIII. BALLOONS, PARACHUTES, KITES, ETC.

Design and construction of balloons; Inflation; Equipment; Inspection; Maintenance; Log records; Traffic rules; Design and construction of parachutes; Maintenance; Operation.

PART IX. AIRSHIPS — NON-RIGID, SEMI-RIGID AND RIGID

Design and construction of non-rigid, semi-rigid, and rigid, Airships; Inspection; Tests; Specifications for materials Equipment; Instruments; Maintenance; Inflation; Operating rules Mooring; Log records.

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Roma Being Assembled

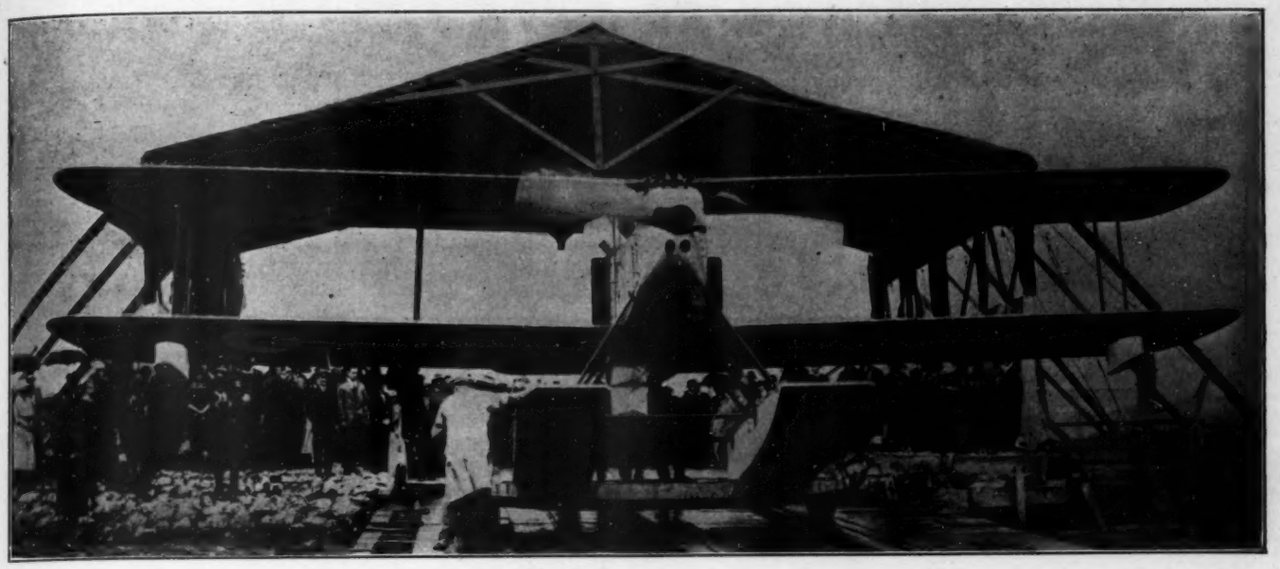
The work of erecting the semi-rigid dirigible Roma, purchased recently from the Italian Government for the Army Air Service, has been begun at Langley Field. The preliminary preparations are out of the way so that the work may proceed rapidly. It will be six months, however, before the airship is ready to fly.

The Roma has completed all of the various test flights, in Italy. She was knocked down when shipped to the United States.

Friesley Falcon Designer

The designer, builder and pilot of the Friesley Falcon, B. M. Spencer, has severed his connection with the Friesley Aircraft Corp. which he was with in the capacity of Chief Engineer.

The Fairey Type IIID Seaplane



THE LAUNCHING OF THE FAIREY TYPE IIID SEAPLANE BUILT FOR THE AUSTRALIAN NAVAL AIR SERVICE
Wide World Photos

The Australian Naval Air Service has recently initiated a program of construction with the launching of the A.N.A.1, a Fairey type IIID seaplane. This machine is forerunner of six squadrons of 12 machines each which the A.N.A.S. has on its program of construction.

The original of the type IIID, the type III, first appeared in 1917 with a 260 hp. Sunbeam engine. A modification of this machine, the IIIA, was fitted with a landing gear and was used as a general purpose ship's plane. Later air bags and hydrovanes were fitted for a series of experiments in landing on the sea. A further change was made by replacing the floats and increasing the wing area while still using the same fuselage and engine, in which form the machine was used as a sea bomber. Finally came the type IIIC with a 375 hp. Rolls-Royce "Eagle" engine, smaller wings, and a resulting greater speed than the bomber. The machine did good work in reconnaissance, and modifications of it were built from time to time. One of these modifications was the machine which was to have been flown across the Atlantic by Sidney Pickles, the modifications in this case being in the form of increased wing area to carry the extra fuel load. Another modification was the Fairey entry for the 1919 Schneider Cup Race. In this machine the wing area had been reduced to increase the speed, and the seaworthiness of the craft increased in anticipation of rough weather.

The type IIID, which is illustrated herewith, is another modification of the IIIC as far as minor details are concerned, but is essentially the same machine. The construction throughout follows orthodox seaplane practice with one or two exceptions which are worthy of mention. Chief among these exceptions is the Fairey variable camber gear. This gear is very simple and has given good results in practice, materially lowering the landing speed of any machine to which it is fitted. It consists for the most part of a flap extending over the full length of the wing and hinged on the rear spar. This flap is operated by the pilot through a control wheel and worm gears by means of which the maximum camber may be put on the wing for climbing and gliding and the minimum for level flying. The flap is plainly shown in the accompanying picture.

An approximate estimate, in the absence of data, of the actual lift coefficient attained with this gear is in the neighborhood of 0.9 absolute. As a result of this a fairly high wing loading can be employed without a proportional increase in the landing speed.

Another exception to usual practice is found in the engine mounting. The Rolls-Royce "Eagle" of 360 hp. is mounted in such a manner that the whole front portion of the fuselage, up to a point just behind the engine, is a separate unit with straight longerons, and by undoing a few bolts the entire engine can be removed en bloc from the fuselage.

The following is a brief specification of the machine:

Span	46 ft. 1¼ in.
Chord	5 " 6 "
Gap	5 " 7 "
Length	36 " 1 "
Total wing area	500 sq. ft.
Weight, fully loaded	5050 lb.
Fuel capacity	105 gal.
Oil	8 "
Useful Load	1060 lb.
High Speed	96 knots (110 m.p.h.)
Climb to 5000 ft.	6 min. 40 sec.
Ceiling	17,000 ft.

Aircraft Steam Engine

Invention of a system of steam propulsion for airships is claimed by Captain W. P. Durtnall, who was a British naval officer during the war, and up to a year ago staff captain in the chief mechanical and electrical engineers' department of the Royal Air Force.

It is maintained that the new system will function at altitudes hitherto unattainable with the ordinary type of internal combustion engine.

The invention is said to do away completely with the ordinary boiler, the steam being generated by means of internal combustion power or heat energy. The superheated steam heat energy is supplied to special steam motors which are reversible and can be controlled from a central control station. Only heavy oil is used as fuel, and it is claimed that the driving machinery can be safely placed inside the frame of the airship instead of in separate gondolas outside, thus bringing about a great reduction in air resistance and consequently reducing the power required for propulsion.

The engine or steam motors, as Captain Durtnall calls them, are of the double-acting type, requiring no flywheels.

Aviation Insurance

Under the management of Mr. R. R. Blythe, formerly a lieutenant in the Royal Air Force, Messrs. Johnson & Higgins, Insurance Brokers, 49-51 Wall St., New York City, have created a department to handle all forms of aviation insurance.

"Who's Who in American Aeronautics"

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Every week, AVIATION AND AIRCRAFT JOURNAL prints the biographical sketch of men who are prominent in American Aeronautics. These sketches will be published later in pamphlet form. As so many of the officers change their stations often, it is believed that a semi-annual issue will be necessary. In compilations of this character many errors and omissions occur. It will be appreciated of corrections are sent to "Who's Who" Editor.

Stanley Hamer Weaver

WEAVER, STANLEY HAMER, Printer; born, Johnstown, Pa., Aug. 9, 1893; son of Martin Luther Weaver and Martha Melinda Weaver.
Educated: Public schools and high school of Johnstown, Pa.
Professional: Printer.
Aeronautical Activities: School of Military Aeronautics, Ithaca, N. Y.; Scott Field, Payne Field, Park Field, Carlstrom Field.
Flying Rating: Reserve Military Aviator.
War Service: Aviation Section, Signal Corps, Jan. 1918 to April 1919.
Member: American Legion.
Present Occupation: Printer, Pittsburgh Gazette Times.
Address: Gazette Square; home, 6439 Aurelia St., Pittsburg, Pa.

Carl Condit Van Ness

VAN NESS, CARL CONDIT, Broker; born, Newark, N. J., Oct. 9, 1894; son of Wallace Van Ness and Anne (Waldron) Van Ness.
Educated: 1905-1912, Newark Academy; A. B. 1916, Columbia University.
Professional: Newspaper man 1916-1920; Cotton Cloth Broker, 1920-1921.
Aeronautical Activities: S.M.A. Austin, Tex., Gerstner Field, La., Post Field, Okla.; 2nd Lieut., Air Service, Aug. 1918; 1st Lieut., Air Service, Signal Reserve Corps, March 1919.
War Service: Enlisted, May 10, 1916; discharged, Jan. 1919.
Member: Sons of the American Revolution; Holland Society of New York.
Present Occupation: Cotton Cloth Broker.
Address: 4 Cedar St., N. Y.; home, 121 Mt. Pleasant Ave., Newark, N. J.

Winfield Scott Hamlin

HAMLIN, WINFIELD SCOTT, 1st Lieut., Air Service; born, Dillsboro, Ind., Sept. 1, 1885; son of Walter S. Hamlin and Minerva C. Hamlin; married, Maude Louise Enright, Sept. 10, 1908.
Educated: High school and private colleges.
Professional: Lawyer.
Aeronautical Activities: Training and special work in aerial mapping; Western coast defences; A.E.F. in Germany.
Flying Rating: Reserve Military Aviator, May 1919; Airplane Pilot, Jan. 1920.
War Service: Enlisted, Sept. 13, 1917; 2nd Lieut., June 1918; 1st Lieut., July 1920 to date.
Present Occupation: 1st Lieut., Air Service.
Address: Langley Field, Va.

Raymond P. Palmer

PALMER, RAYMOND P., Manufacturer; born, East Bridgewater, Mass., Dec. 27, 1895; son of Frank Herbert Palmer and Jessie (Davies) Palmer; married, Margaret Campbell, Oct. 4, 1919.
Educated Braintree Public Schools; Phillips Andover, and Thayer Academy; Burdett College.
Professional: Treasurer and manager, The Palmer Co.
Aeronautical Activities: Army Air Service, April 1918 to Jan. 1919.
Flying Rating: Airplane Observer.
Member: Aero Club of Massachusetts.
Present Occupation: Treasurer, The Palmer Co.
Address: 120 Boylston St., Boston, Mass.; home, 14 High St., Rockport, Mass.

Will Dorrah Williams

WILLIAMS, WILL DORRAH, Automobile Business; born, Pana, Ill., May 12, 1893; son of Tice W. Williams and Sarah (Dorrah) Williams.
Educated: Public and high schools of Pana, Ill.; School of Military Aeronautics, Cornell University.
Professional: Photography; automobile business since 1914.
Aeronautical Activities: Flying training at Carruthers Field.
Flying Rating: Reserve Military Aviator.
War Service: Air Service, Dec. 1917 to Dec. 1918.
Present Occupation: Garage Manager.
Address: 222 W. Main St., Taylorville, Ill.; home, 307 E. 6th St., Pana, Ill.

Harold Eden Shaw

SHAW, HAROLD EDEN, Manufacturing; born, Ashaway, R. I., April 3, 1893; son of Alvin Eden Shaw and Amy L. (Babcock) Shaw.
Educated: Public schools of Ashaway, R. I. and Monson, Mass.; Monson Academy; B.A. 1914, Amherst College.
Professional: 1914 to 1921 wtih Holliston Mills.
Aeronautical Activities: Training at Camp Dick, Wilbur Wright Field, Chanute Field,, and Brooks Field.
Flying Rating: Reserve Military Aviator.
War Service: Nov. 1917 to Jan. 1919.
Member: Aero Club of America.
Present Occupation: Sales Executive, Holliston Mills.
Address: Norwood, Mass.

Harrison Gage Crocker

CROCKER, HARRISON GAGE, 1st Lieut., Air Service; born, Wahpeton, N. D., July 4, 1888; son of William Goss Crocker and Sarah B. Crocker; married, Ethel Toye, Dec. 1, 1920.
Educated: High school.
Professional: Publishing business, 1907 to 1912; mechanical foreman, 1912 to 1917.
Aeronautical Activities: Gosport instructors course, Kelly Field; engineering course in airplanes, engines and parachutes, 1920; Langley Field in connection with Project B, 1921.
Flying Rating: Reserve Military Aviator; Airplane Pilot.
Present Occupation: 1st Lieut., Air Service.
Address: Lisbon, N. D.

Benedict Arthur Coyle

COYLE, BENEDICT ARTHUR, 1st Lieut., Air Service; born, Charlottetown, P. E. I., Canada, Oct. 1, 1891; son of Stephen Coyle and Jane Coyle; married, Mable Morgan, May 1, 1921.
Educated: Q. S. S., Canada.
Professional: Bank of Montreal, 1908-1911; United States Trust Co., 1916-1917.
Aeronautical Activities: Training at camps in U. S. and France; with 168th and 1st Aero Squadrons in France and Germany, 1918-1919; 14th Squadron, Langley Field, 1921.
Flying Rating: Airplane Observer.
War Service: Army, Infantry and Air Service, since Aug. 23, 1917.
Present Occupation: 1st Lieut., Air Service.
Address: Langley Field, Va.

Randall Thomas Henderson

HENDERSON, RANDALL THOMAS, Newspaper Editor and Publisher; born, Clarinda, Iowa, April 12, 1888; son of Nelson R. Henderson and Katherine (Thomas) Henderson; married, Vera Louise Riopel. Oct. 17, 1911.
Educated: Grammar and high schools of Shenandoah, Iowa; A.B. 1911, University of Southern California.
Professional: Editor and Publisher.
Aeronautical Activities: Training at Camp McArthur, Camp Greene, Kelly Field.
Flying Rating: Reserve Military Aviator.
Member: Aero Club of Southern California.
Present Occupation: Newspaper editor and publisher.
Address: Blythe, Calif.

James W. Hammond

HAMMOND, JAMES W., 1st Lieut., Air Service; born, Ford City, Pa., Oct. 27, 1893; son of Edward E. Hammond and Olive L. Hammond; married, Ruth V. Adams, March 30, 1920.
Educated: Ford City grade and high schools; Grove City College; D.D.S. 1915, University of Pittsburgh.
Professional: Dentist, 1915-1917.
Aeronautical Activities: Training at various schools and camps; instructor of cross country flying at Taylor Field and Love Field; course in aerial photography at Langley Field; Officer in charge of Production, 1st Provisional Photo Detachment, 1st Prov. Air Brigade.
Flying Rating: Reserve Military Aviator, Oct. 1918; Airplane Pilot, Feb. 5, 1921.
Present Occupation: 1st Lieut., Air Service.
Address: Langley Field, Va.; home, Ford City, Pa.

Philip Sheldon Barnes

BARNES, PHILIP SHELDON, Advertising; born, Kansas City, Mo., May 12, 1893; son of William Gregory Barnes and Clara Belle Barnes.
Educated: High school, Kansas City, Mo.; 1918, University of California.
Professional: Advertising Manager of different automobiles schools since 1914.
Aeronautical Activities: Ground School S.M.A., Berkeley, Calif.; March Field, instructing 2nd Solo Stage until discharged in 1919.
Flying Rating: Reserve Military Aviator; Airplane Pilot.
War Service: Border Patrol with Battery B, Laredo, Tex., June to Dec. 1916; Army, Nov. 1917 to April 1919.
Member: Aero Club of America; American Legion.
Present Occupation: Advertising Manager of National Automotive School.
Address: 807 S. Figueroa St.; home, Vanderbilt Hotel, Los Angeles, Calif.

Rosenham Beam

BEAM, ROSENHAM, Captain, Air Service; born, Bardstown, Ky., June 11, 1895; son of David Dee Beam and Mary Jane Beam; married, Carolyn Frances Wittman, Dec. 6, 1917.
Educated: Louisville High School.
Professional: U. S. Navy and U. S. Army since Oct. 23, 1913.
Aeronautical Activities: Aerial Observation Training, Post Field; Aerial Gunner's Training, Selfridge Field; Adjutant Pilot and Observer on Border Patrol, Texas, June 1919 to July 1920; Adjutant and Observer, Artillery Firing Center, Camp Knox, July 1920 to May 1921; duty at Langley Field since May 1921.
Flying Rating: Aerial Observer's Certificate, June 1918; Aerial Gunner's Certificate, Oct. 1918; *War Service:* As above.
Present Occupation: Captain, Air Service.
Address: 178 Bellarre Ave., Louisville, Ky.

Carlye West Graybeal

GRAYBEAL, CARLYLE WEST, 1st Lieut., Air Service; born, Columbia Falls, Mont., Aug. 25, 1893; son of Charles Lee Graybeal and Nettie West Graybeal; married, Annette Holroyd, Nov. 9, 1918.
Educated: Public schools; University of Iowa, 1911-1912; O.A.C., 1913-1916.
Flying Rating: Reserve Military Aviator, Nov. 1918; Airplane Pilot, Nov. 1920.
Present Occupation: 1st Lieut., Air Service.
Address: Kelly Field, Tex.

Howard Earle Coffin

COFFIN, HOWARD EARLE, Automobile Manufacturer; born, West Milton, Miami County, Ohio, Sept. 6, 1873; son of Julius V. Coffin and Sarah Elma (Jones) Coffin; married, Matilda V. Allen, Oct. 30, 1907.
Educated: Public schools of West Milton; high school, Ann Arbor; B. Eng., Eng. D., University of Michigan.
Professional: Early pioneer work with internal combustion engines; built first automobile (steam) in 1899; Chief Engineer, Olds Motor Works, 1902-1905; Vice President and Chief Engineer, E. R. Thomas Motor Company, 1906-1909; 1909 to date, Vice President, Hudson Motor Car Co. Proposed inclusion of aeronautical engineers in S.A.E.; Assisted in organization of association of aircraft manufacturers and working out of cross-licencing of aircraft patents.
Aeronautical Activities: Chairman, Advisory Board on Aircraft Council of National Defense; Chairman, Aircraft Production Board; member of American Aviation Mission.
War Service: Member, Naval Consulting Board, Council of National Defense; Aircraft Production Board.
Member: Aero Club of America; S. A. E.; A. S. M. E.; Detroit Club; Engineers' Club (N. Y.); University Club (Detroit); Metropolitan Club (Wash.).
Present Occupation: Vice President, Hudson Motor Car Co.
Address: Hudson Motor Car Co., Detroit, Mich.; home, Grosse Pointe Shores, Mich.

Forest Fire Patrol Work

What the Air Service is accomplishing along the line of forst fire patrol work and the method of operation is partly shown by the following outline of the work carried on during the months of May, June and July by Flight B of the 12th Observation Squadron, the headquarters of which is at Nogales, Arizona:

Geographical survey maps marked off into coordinate sections were used; on spotting the fire the observer communicated with the nearest radio station. Radio stations were located at Tucson and Nogales landing fields. In making the radio report the following method was used.

(a) Station call, three times.
(b) Key letter for route and observer.
(c) Fire—FFF.
(d) Old fire—O. New fire—N.
(e) Location by coordinates.

The maps were coordinated into five mile squares, which were further subdivided into one mile squares. In reporting a fire its location in the five mile block was first given as, for example, I-K. It was further located in the one mile square by the additional coordinates of the one mile square in which the fire was located. The one mile squares were divided usually into four quarters. The upper left hand corner numbered 1; the upper right hand corner 2; the lower right hand corner 4; and the lower left hand corner 3; thus placing the fire within one quarter of a mile of its location. A typical location might be "7 K 3 A 2". This would locate a fire in the five mile block, 7 K; in the one mile block 3 A, and in the upper right hand quarter mile section. The system of coordinating was a very simple one, as follows: each five mile block was numbered from left to right and lettered with capital letters from top to bottom, the one mile squares were similarly numbered from left to right and lettered from top to bottom with small letters.

(f) Area in acres—A15 (15 acres) AS (less than one acre.)
(g) Cover—CT (Timber)
CB (Brush)
CO (Open)
CX (Burned or cut over)
(h) Slope—SL (Level)
SG (Gentle)
SS (Steep)

Report on slope was followed by direction letter, N.S.E.W. Thus a typical report under (h) would be "S G N", indicating sloping gently to the north.

(i) Ground wind velocity and direction as, for example, "15 N" would indicate north wind of 15 miles per hour. If there was no wind the observer reported "No." under (i). Thus a typical fire report would be "ZD, ZD, ZD, XY, FFF, N, 7K 3B1, AS, CB, SGS, 15N." Immediately upon receiving the radio report, the operator relayed the report to Forestry Headquarters by telephone.

The observer made record of all information sent by radio and turned this information in at the radio station immediately upon landing. This information was telephoned to Forestry Headquarters to act as a check on the radio communication. The observer while patrolling, if there are no fires to report, nevertheless communicated with the radio station every ten minutes as follows:

(a) Station call repeated three times.
(b) Key letter for route and observer.
(c) RAS—signifying nothing to report.

The observer was required to check out with the radio station by a system of panels before leaving the vicinity of the airdrome to insure that his radio set was properly functioning. For this purpose each observer has a key letter, also a key letter for the route he is patrolling and a corresponding panel for key letter.

A coordinated map is kept in the flight operations room. All forest fires are marked on the map. Active fires known and located are marked with red-headed pins. old fires extinguished are marked with black-headed pins. New fires discovered by the observer and not notified by Foresters are marked with yellow-headed pins. The pilot and observer are required to report to the operations room and carefully study the map, verify the location of all fires on their maps, and receive such other information and instructions that might pertain to the day's patrol. Immediately upon landing the pilot and observer again proceed to the operations room, reporting all information they have gained.

During the time of this patrol Forestry officials were permitted to ride over the forest areas patrolled, in order to assist them in fighting fires. In each case the Forestry officials were required to apply in writing to the camp commander. The usual release form was used in every case, and a report of each such flight made with the name of the Forestry official, was submitted to Corps Area Headquarters.

Two Aerial Views of the Timber Blown Down by a Hurricane on Olympia Peninsula

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Chicago-Evanston Air Line

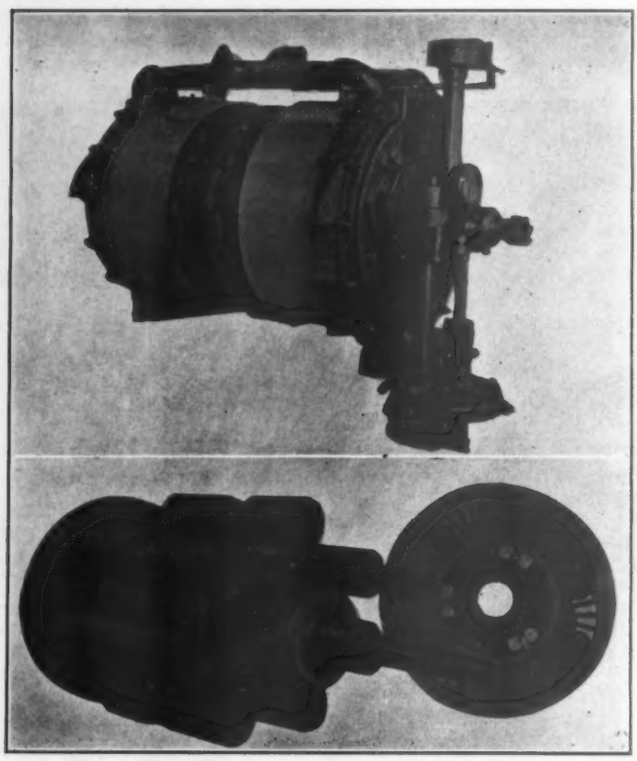
The LaPearle Brothers are using a Curtiss Seagull float seaplane on the service they are maintaining between Edgewater Beach, Evanston and Chicago. The machine carries three passengers and will make the trip from the loop in Chicago to the beach in 10 minutes.

Aircraft Engine Development

In the July issue of the *Journal of the Society of Automotive Engineers* appears an interesting paper on the subject of the requirements of aeronautic powerplant development, written by Messrs. G. J. Mead and L. E. Pierce, Aeronautical Engineers with the Wright Aeronautical Corporation of Paterson, N. J. This paper discusses the probable trend of development of aviation engines, showing the reasons for the types which are likely to become more or less standard.

After reviewing the development of the various types of engines and analyzing the effect of their characteristics on airplane performance, the authors, in summarizing the situation, state that we have not reached the limiting size for any type of engine as regards the maximum power available.

No increase in engine performance can be expected unless new materials of construction, new fuels or new cycles of

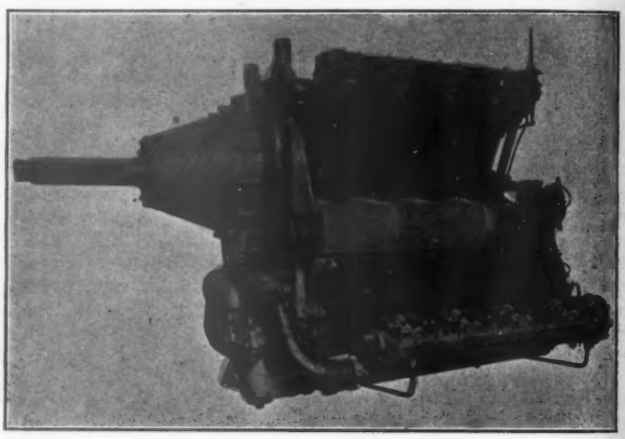


A Barrel Type Engine: The 350 Hp. Almen 7 Cylinder Engine

operation are made available. Continued development will refine the practices of the art and result in bettering the life of the engine and the service it renders, rather than its performance. Therefore, increased airplane performance must be secured mainly by improvement in airplane design. Great advance seems to be possible in this direction. One reason for the tremendous powerplants available for airplanes has been the efforts to secure performance by brute strength. Absurdities can soon be reached if this trend of development continues. It is certainly worth while to consider what can be done with a reasonable-sized power-unit, by altering the design of the airplane. As shown in the last Pulitzer Race, excessive horsepower is not necessary to secure high speeds. The next few years should see a reduction in the power demanded of pursuit engines.

It is high time that attention be given to a most important problem, the fuel mileage obtainable from a given airplane. It is unquestionably true that the average person could not afford to operate some airplanes, even though he might be able to purchase one, because of the poor mileage secured from a gallon of fuel. This is an essential consideration for commercial work, due to its effect on the profits of an operating company, and should be given study by the military authorities also, on account of the effect it has upon the quantities of fuel required in case of hostilities. This is, to our minds, the best and most obvious reason why the power requirements for aeronautical powerplants should be reduced rather than increased. It is not commercially possible to build so many power units within a given range. Airplane designers must be satisfied with fewer units, if we are to commercialize the business.

It is believed that the effect of engine dimensions on maneuverability is largely overestimated. The reason that popular comment is so often to the effect that the engine is the most important factor is the fact that there is no ready means by which the aerodynamic qualities of the airplane affecting maneuverability can be thoroughly analyzed and visualized. For similar horsepowers engine type rather than overall size will have the greatest effect on the parasite drag of the fuselage group. The efficiency of the cooling-element design for water-cooled engines is considerably better than that for air-cooled engines. Between practical limits, the effects on the performance of the airplane of variations in the values of engine weights per horsepower, of cooling efficiency, of fuel



An X Type Engine: The 1,000 Hp. Napier "Cub" 16 Cylinder Engine

economy and of altitude performance of the engine are very pronounced. The demands of super-performance in military designs and greatest operating efficiency in commercial designs will require the development of engine types which are most favorable in these respects. The relative importance of the factors involved is governed by the particular service for which the airplane is designed.

Problems of powerplant installation are centered about the need of a close cooperation between the builders of airplanes and engines. The requirements of each system of installation can be met only by acquiring a correct knowledge of what these requirements are and satisfying them fully. A study of the engine mounting in complete detail, developing the truss system to accommodate all of the engine forces involved, both static and dynamic, is a most important requirement in insuring a succesful installation. Simplicity and practicality of design and the suitability of the accessory equipment used are most essential in the development of the several powerplant systems. The development of the complete powerplant installation must be made with a view to permitting the greatest possible degree of service accessibility. Only in such a way can the proper mechanical attention be assured for the powerplant. The fact must not be lost sight of that the industry is in a formative period and for this reason we must expect to spend a tremendous amount of time and money in research. We cannot standardize without knowledge, and we cannot obtain that knowledge without research.

Some Technical Problems in Aeronautics *

Papers read at the Joint Session of the A.S.M.E. and the S,A:E:

In connection with the joint visit of the Aeronautic Division of The American Society of Mechanical Engineers and the Society of Automotive Engineers to the Air Service Station at McCook Field, May 21, a very interesting technical program was presented by the members of the Field's staff. Joseph A. Steinmetz, Chairman of the A.S.M.E. Aeronautic Division presided. Brief summaries of the eight papers read immediately follow.

Aluminum Cylinder Castings

Discussing this subject, E. H. Dix stated that a satisfactory bond between the steel cylinder and the cast aluminum head was formed with either sherardized or tinned steel cylinders. Sherardizing was decided upon because of the higher melting point of zinc.

The problem of an alloy for valve-seats inserts and spark-plug bushings was solved by the adoption of a rolled phosphor bronze containing 3½ per cent tin chosen because its coefficient of expansion approximated that of aluminum.

The next step after these preliminary experiments was to make the casting. This was made up using dry sand cores inside and outside. Three overflow risers were placed to allow for the pouring of metal through the mold.

Metal was poured through the mold so as to heat the cylinder and prevent the cracking of the aluminum casting if possible. However, the first casting showed a serious axial crack just over the steel ring. It was therefore decided to put a heating coil inside of the cylinder. This was done and a second casting poured. In this case, however, the cores were thoroughly heated before pouring, and the whole mold was placed in a core oven at 500 deg. fahr. immediately after pouring and allowed to anneal for a day and a half. This eliminated the cracking around the steel cylinder, but a crack developed in another place, that is, between two of the valve-seat inserts. It is believed that these difficulties can be overcome by slight changes in the method outlined, although preheating the mold and the subsequent annealing would make a rather expensive production job.

It has therefore been decided to endeavor to find an alloy which is less liable to crack than the one previously used which was 7 per cent copper, 1 per cent tin, and the remainder aluminum, this being recommended from the experience gained in England on a similar proposition. To guide in this selection, a hot-shortness test was devised. This consists in casting a test bar around steel lugs fixed 12 in. apart. The first three bars used in this connection were aluminum alloys containing 8 per cent copper, 10 per cent copper and 7 per cent copper + 1 per cent tin, respectively, and these all cracked. The fourth bar is a silicon-aluminum alloy on which the Material Section is experimenting at this time. This bar showed no crack when cast in this manner. Arrangements are being made at the Bureau of Standards to have coefficient-of-expansion tests made on this alloy.

Mr. Dix pointed out that he had summarized very briefly a problem now of very vital interest to the Air Service and of which no more than the surface had been scratched, and he hoped by so doing an interest might be stimulated among the engineers present which would result in valuable suggestions for future work at the Field in this connection.

Air-Cooled Airplane Engines

In his treatment of this subject, S. D. Heron pointed out that the advantages of an air-cooled engine for military purposes were that it is less vulnerable to fire, freezing does not occur during long drives, and overheating due to a steep climb is temporary. The air-cooled engine however, has not reached the finality of design of the best water-cooled engines, although cylinders up to 150 cu. in. of swept volume have equaled the best water-cooled practice in power, brake mean effective pressure, and exhaust-valve reliability. Fuel economy with maximum power mixture is from 5 to 15 per cent less than in the best water-cooled engines. The advantages of the air-cooled engine have been shown in service when receiving a minimum of skilled attention. They have given good results in the Egyptian desert and in Mesopotamia.

.In most designs of a cylinder for the radial engine, a compromise between cooling efficiency and proper valve operation is evident. The speaker pointed out that in the air-cooled cylinder cheapness and lightness have been overemphasized, with the result that cooling features have suffered . The resulting designs would not be tolerated in a high-class water-cooled motor.

As to V-engines, twelve-cylinder types up to 240 hp. have been constructed satisfactorily and have given good service. The valve operation of this type is complicated because of the location of the exhaust side of the cylinder relative to the air blast.

Dealing with the question of cylinder design, Mr. Heron described the results secured by the British with the spherical aluminum head cast or screwed to an integral fined steel barrel. He presented data from a number of tests of air-cooled engine cylinders which show that the highly efficient cylinder has not a low weight per cubic inch of swept volume. He illustrated one of the largest and most powerful air-cooled cylinder yet made—the R.A.E. 19 T., with 8 in. bore and 10 in. stroke and developing 129 b.hp.

Carburetors for Aircraft

The carburetor problems of aircraft engines were outlined by C. Fayette Taylor in his remarks. A more simple type of carburetor can be utilized in airplane than in automobiles, the open-tube type with some form of accelerating well being the most common. Most aircraft engines carry from two to six carburetors, which constitutes a problem in obtaining uniform adjustment and synchronization. This precludes the ordinary needle-valve fuel adjustment, and fixed fuel orifices are therefore the rule. The necessity for operating under extreme variations of temperature and pressure requires that the fuel-metering orifices must be large enough to take care of the highest density at which the engine will operate. A manual control is therefore provided.

Extreme variation from the horizontal position brings about a severe condition for the aircraft carburetor. This condition is met by carefully locating the float chamber in relation to the fuel nozzles and metering orifices.

In order to reduce the fire hazard, the carburetor air intake must project outside the engine cowling. This mean that the aircraft carburetor must take its air from a slip stream traveling from 100 to 200 m.p.h.

Airplane Camouflage

The purpose of color camouflage for airplanes as stated by Gerald P. Young, is to break up the outline of the plane. The coloring of the upper surfaces is a combination of tan, blue green and mauve purple. The general scheme followed is to divide the surface into three irregular areas of large curving boundaries, applying these three colors both to the upper surface of the top wing and the upper surface of the lower wing. The same colors are brought back along the top of the fuselage and tail surfaces. The idea is to make the plane less visible when observed from above, and a tan section, blending with tan earth colors, causes it to become practically invisible, leaving only the darker colors which, being arranged irregularly, throw the eye off from the general outline of the plane and cause the observer to lose the plane in the background beneath.

This system is of value for planes left in the open at flying fields or when parked in the field at night, and also for con-

* Courtesy *Mechanical Engineering*

cealing bombers flying at low altitudes and observed by pursuit planes from above.

The under surfaces of planes are camouflaged to give a light reflecting surface and the coloring scheme is burnished aluminum, light blue, light purple and white. This system makes it possible for an airplane regularly finished in dope and varnish having a light yellowish cast and visible at altitudes up to 17,000 ft., to become invisible at an altitude considerably under 10,000 ft.

Radio Communication

Dealing with this subject, O. E. Marvel described the characteristics of continuous wave transmission and the vacuum tube, the one thing that made the radio telephone possible. He explained that all airplanes radio sets are now designed for telephoning and continuous wave telegraphy. He emphasized the importance of radio communication, especially in military movements such as artillery fire control, infantry contact work and reconnoissance. He also emphasized the importance of wireless in direction finding—used during the war to locate enemy radio stations and to navigate aircraft.

Airplane Radiators

Lieut. Bayard Johnson spoke on the subject of airplane radiators. He pointed out the fundamental differences between the problems of radiators on an airplane and on an automobile engine, emphasizing the large quantity of water which must be forced through the airplane radiator and the need for unrestricted flow. The standard radiator core adopted by the Air Service is made of seamless round copper tubes with hexagonal ends. It gives small resistance to water flow, has no internal soldered joints, can be easily installed, is light and is most effective for air speeds of 80 m.p.h. and over. In discussing the location of a radiator he emphasized the necessity for a support as free from vibration as possible. Comparing relative values of frontal, wing, landing-gear and side radiators, the advantages of the side radiator were shown, as they are protected from damage and have high air speeds available. Although the piping is long, it is accessible and warms the pilot bands. He also emphasized the need for accurate information as to the performance of different types of radiators and stated that the Engineering Division of the Air Service was progressing favorably in obtaining this information.

Aerial Photography

In discussing aerial photography, Capt. G. W. Stevens described different types of films and plates and showed that film in rolls permitting 100 exposures, which does not require bulky, heavy magazines and is not subject to chipping or breakage, is more desirable for aerial photography. With suitable ray filters to eliminate haze it is possible to get good negatives from heights of three to four miles. A camera specially designed by Major Bagley of the Corps of Engineers has three lenses, making one vertical and two oblique negatives at the same time. At an elevation of 15,000 ft. it takes in an area 8 miles wide. With this mechanism artillery fire control can be carried into the enemy country with an error of but 200 ft. in 15 miles. The use of the camera in mapping was explained by the speaker, who showed a slide of a mosaic of the city of Rochester made up of 83 negatives.

Captain Stevens also explained the need for oblique and vertical pictures which, viewed through the proper apparatus, cause the ground detail to stand out in relief.

International Air Navigation Congress

Under the patronage of the French Under-Secretary of State for Air, the French Chambre Syndicale des Industries Aéronautiques has taken the initiative in convening an International Air Congress, to be known as the First International Air Navigation Congress, and to be held concurrently with the next Paris Aero Salon, from Nov. 15 to 20, 1921, to afford an opportunity of discussing the various problems connected with commercial aviation. The President of the organizing committe is P. E. Flandin, late Under-Secretary of State for Air, who will be assisted by a number of well-known French experts as vice-presidents. The President of the Technical Committee will be R. Soreau, who is President of the Aviation Commission of the French Aero Club. The Air Navigation Committee will be under the presidency of Colonel Sacconey.

By inviting communications from all interested in the question of commercial aviation, it is hoped to establish an interchange of ideas which will be of great help in the furtherance of aviation all over the world, and give an opportunity of discussing such problems as effect the future development of commercial flying. Those who wish to help in any way toward the success of the Congress can do so in two ways—by becoming full members or by becoming associate members. The fee charged for the former has been fixed at $5, while associate members are charged $3. Full members are entitled to send in communications to the Congress, and will also receive a résumé of the communications. Associate members are not entitled to send communications, but will be able to take part in any receptions held, or in practical demonstrations at Le Bourget, etc. Payment should be by cheque or money order, made out to the Chambre Syndicale des Industries Aéronautique, 9, Rue Anatole de la Forge, Paris (XVII). At the conclusion of the conference the proceedings will be published in full, and a copy of the published report will be obtainable by associate members as well as full members for the price of $5.

Printed forms of application for membership, as well as intimations of papers or communications which it is intended to submit to the Congress, can be obtained from the General Secretary, International Air Navigation Congress, 9, Rue Anatole de la Forge, Paris (XVIIe).

Communications should be kept as short as possible—about 2,000 words will be a suitable length—and should be typewritten on one side of the paper only. Line drawings may accompany the communications, but they should be carefully drawn, and the space available for their reproduction is limited to two pages of the report of the Congress. Communications and papers should be submitted before Oct. 15, 1921, so as to ensure a résumé being printed in time for the Congress. Papers which arrive after that date will not be published until the issue, after the Congress, of the Proceedings.

Papers and communications may be written in either of the following languages—French, English, German, Italian or Spanish.

With regard to the papers submitted, these should bear on one of the following subjects:—

(A) Technical Committee

(1) The utilization of results of wind tunnel model tests for full-size calculations.

(2) Airplanes and seaplanes (monoplanes or multiplanes). Thick and thin wings. All-metal structures and composite structures.

(3) Airships with great carrying capacity.

(4) Commercial aero engines; their arrangement in the machine and their transmission gear.

(5) Apparatus for fixing the position of an aircraft and of tracing its route.

(B) Air Navigation Committee

(6) Air routes.—Outline, management, wireless, meteorological information, aerodrome installation and ground organization.

(7) Commercial aviation.—Commercial machines, (airplanes or seaplanes, passenger, hoods, and mail machines). Charts. Organization and exploitation of regular air lines. Air mail.

(8) Air legislation.—Regulations. Customs, Examination of personnel and material. Safety. Insurance.

The Imber Safety Tank

Statistics show that quite a percentage of fatalities due to airplane accidents were caused by reason of the fact that the gasoline tank exploded upon impact with the ground, setting fire to the plane, the occupant thereof succumbing to the flames before he could extricate himself from the wreckage.

Mr. Jack Imber of London, England, has invented a fuel tank for airplanes which it is claimed is proof against leakage in the event of its being punctured and proof against fire when pierced by incendiary bullets or other projectiles. It appears that a small bullet can inflict extensive damages when passing through a fuel tank. In many cases it has been found that an ordinary bullet will tear a hole 6 or 8 in. in diameter in the side of the tank opposite to that through which the bullet enters. This phenomenon has perplexed many inventors who were seeking to prevent the gasoline from leaking from bullet holes. Investigation disclosed that the larger hole was due to the enormous pressure of fuel against the far side of the tank. On entering the tank the progress of the bullet is partly arrested by the liquid and sets up in the liquid a pressure wave which increases both in area and force from the point of entry to a distance of approximately 2 ft. 6 in. Thus when a bullet travels through a tank its momentum is reduced, but on the other hand in a tank of ordinary size it is found that up to a certain point the farther one side wall is from the other the larger will be the hole torn upon the exit of the bullet, because the pressure wave in the liquid is the main cause of the larger hole torn at the exit.

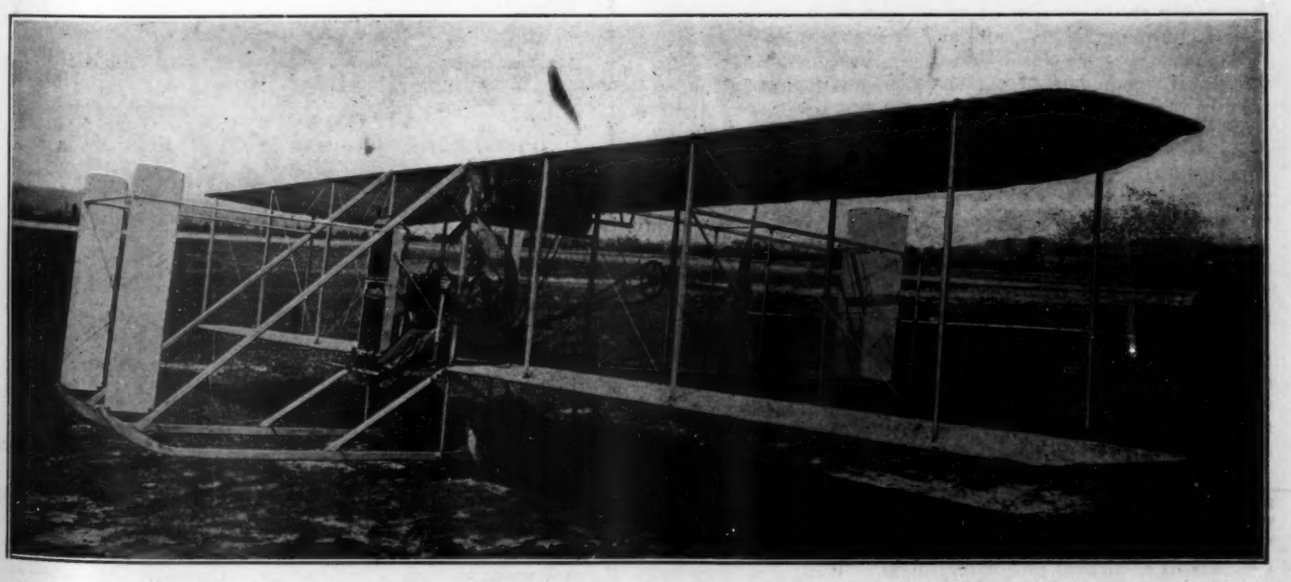
The Imber principle is to allow the energy of the pressure wave to dissipate by providing the tank with a resilient outer rubber covering, so that when the pressure exceeds a certain point the tank yields and the rubber stretches out from the side of the tank under pressure. Naturally the highest point on the stretched rubber covering is that through which the bullet makes its exit, and the rubber being stretched makes this point also the thinnest portion of the covering, so that when the bullet leaves and the pressure is relieved the rubber comes back to its former shape and completely closes up and seals the bullet hole.

The Imber tank is composed of three parts, an inner tubular aluminum framework to which sheet aluminum baffle-plates are attached, which framework is adapted to fit within and conform to the shape of the shell; the metal shell or casing, made of thinned steel, into which the baffle-plate frame is inserted; and the outside rubber covering which surrounds the entire shell. The resilient or elastic covering returns to its seating against the famework in such a brief space of time that it is impossible for the contents to ignite in the event of the projectile being of an incendiary nature. The outer rubber covering is of specially prepared rubber, approximately ¼ in. in thickness. The edges of the tank are reinforced with an additional rubber strip, ¼ in. thick, vulcanized to the covering rubber.

Minor shocks are, of course, taken care of by the rubber covering, but when a hard blow is struck the internal construction gives. While the framework is strong enough to give adequate bracing to the tank under ordinary usages, it is purposely made collapsible upon the application of a blow likely to cause a puncture. In the case of a landing in which a smash occurs, the rubber covering retains the petrol, no matter how badly the tank may have been battered. While the framework of an aircraft may crumple and strike forcefully against the tank or the tank strike the ground, the result will merely be a distortion of the shape of the tank, thereby minimizing the danger of fire from the inflammable liquid that otherwise would have been sprayed about the wreckage.

To prove the efficacy of these tanks in the prevention of fire a test was recently carried out on a Sopwith Camel machine fitted with the Imber tank. Arrangements were made to effect a dive, which was brought about under severe conditions. The machine was dropped from the airship R.33 from a height of about 1,500 ft. with the engine running. After the crash it was found that the engine, back plate and controls were forced back to the main tank, the cylinders being quite hot enough to vaporize gasoline had the tank burst. The pilot's seat acted as a buffer, and the blow, in addition to distorting the tank, caused a slight tear of the rubber cover, but there was no spray or leakage of gasoline.

Early Aviation History - I



THE WRIGHT MODEL B AIRPLANE (35 HP. WRIGHT 4 CYL. ENGINE) WHICH APPEARED IN 1911 AND WHICH WAS ONE OF THE BEST MACHINES OF ITS DAY. ORVILLE WRIGHT IS SEEN AT THE WHEEL.

Unlicensed Flying

The following account from our British contemporary *Flight* of the proceedings against a pilot for an offense under the Act and Regulations relating to aerial navigation will, we feel, be self explanatory to our readers as to why commercial aviation is on a sound basis in that country when compared to the haphazard manner in which it is being handled here.

On August 13, before the Croydon County Bench, Capt. E. D. C. Herne was summoned at the instance of the treasury for three offences under the Act and Regulations relating to aerial navigation. He was charged with (1) flying an Avro biplane from Croydon to Newmarket on June 27 without any license as a pilot to fly passenger or goods aircraft; (2) with carrying two passengers to Newmarket on the same date without his machine having been certified as airworthy; and (3) with flying on July 21 with passengers from Croydon to Cardiff without his machine having been inspected before the flight by a competent person licensed for the purpose.

The prosecution said that people taken up as passengers knew that the Air Ministry controlled civil aviation, and naturally supposed that the regulations for their safety were being observed. The defendant was summoned for completely ignoring them, for he had no license of any valid sort on the day he took two passengers to Newmarket, June 27. His last license before that expired on May 12, and a letter was sent calling attention to that but he ignored it. One of the things necessary to the granting of a license was medical examination; 90 per cent of the accidents happening in the air were due in some measure to the unfitness of the pilot.

The defense contested this point, and demanded that evidence be called in support of it.

Continuing, the prosecution said that if there had been any defect on account of the defendant's health it might have resulted in the passengers losing their lives. The defendant took out another license on July 1, when he satisfactorily passed the medical examination.

On the second summons relating to the airworthiness of the machine on June 27, the prosection said that the last valid certificate as to the airworthiness of the machine before the date in question was March 12.

An inspector of aircraft testified as to certain defects he noticed in the machine on July 25, including the frayed condition of the control wires.

The defence said that if this were really a summons for protecting the safety of the public he would call evidence to show that there was no safer pilot than Captain Herne. He had flown the equivalent of many times around the world, and had never damaged a person or a machine. What the Air Ministry was doing, the defence suggested, was to protect certain big flying companies who objected strongly to what they called the "middle man", and desired to freeze him out. The defense submitted that the offence, if any, was the purest technicality, and pointed out that this matter concerned the actual livelihood of the defendant.

The defendant, giving evidence, declared that on June 27, from an ordinary common sense point of view, the machine was in absolutely perfect condition, but he had not applied for a certificate because the machine had been standing by since March. Referring to the alleged defect in the machine, he added that he would be quite willing to take his mother up with the controls frayed in the manner described. "There is not a machine in existence on which you could not put your finger on controls frayed somewhere," he observed.

Dealing with the third summons the prosecution said that the defendant received £30 ($150.00) for taking passengers to Cardiff, his machine not having been inspected before the flight. The following day he endeavored to persuade some of the ground men to give him a certificate dated the previous day.

The defendant explained to the bench that his machine had completed the flight perfectly, therefore it was obvious that it was airworthy. He asked for a certificate, which, owing to their being no groundsmen about, he could not get on the previous day, without any wrongful intention.

Defendant was fined £10 ($50) on each of the three summonses, with £10 10s. ($52.50) costs, £40 10s. ($202.00 in all.

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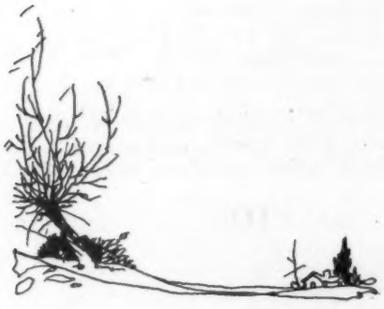

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THE GARDNER, MOFFAT CO., Inc.

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